

# Dispatch

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1442-A Walnut Street, #462  
Berkeley, CA 94709  
ph (510) 843-3902 fax (510) 217-3500  
cal-ipc.org info@cal-ipc.org

*Protecting California's environment and  
economy from invasive plants*

#### STAFF

Doug Johnson, Executive Director  
Jutta Burger, Science Program Director  
Agustín Luna, Director of Finance,  
Operations & Administration  
Bertha McKinley, Program Assistant  
Claire Meyler, Communications & Development Manager  
Nikki Valentine, Conservation Specialist

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#### Cal-IPC Dispatch

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Associate Editor: Claire F. Meyler

Designed by Melanie Haage

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## FROM THE DIRECTOR'S DESK

# The time is now to protect California's biodiversity

By Executive Director Doug Johnson

Climate change is in our face, with fires and floods giving a taste of what's to come. Severe biodiversity loss is here, too, though perhaps less viscerally obvious to many of us (though the pandemic may be considered a manifestation).

Can the world — and California — respond in time?

In September, the International Union for the Conservation of Nature met. Ecologists described invasive species as one of four major pressures on ecosystem services, along with habitat loss, overexploitation, and climate change. To gauge progress in addressing invasive species, IUCN proposes tracking the proportion of countries adopting relevant legislation and adequately funding the prevention and control of invasive species.

In April 2022, the world's countries will meet under the banner of the United Nations' Convention of Biological Diversity. Going into the meeting, one of the goals proposed for 2030 is addressing 50% of high priority invasive species populations and reducing invasive species introductions by 50%. This is ambitious, and yet perhaps not enough.

How is California doing on these metrics? Do we have relevant legislation and adequate funding for invasive species control and prevention? Are we on our way to controlling 50% of top priority populations and reducing introductions 50% in the next eight years?

There are some positive signs. State legislation sponsored by Cal-IPC in 2018 codified a state interagency Invasive Species Council and an expert advisory committee, and the new state budget provides \$5 million for the council (also based on Cal-IPC advocacy).

However, on the negative side, the state's new budget does not include any funding for county Weed Management Areas, the network of partners on the front lines of invasive plant control across the state. This is a lost opportunity to implement a cost-effective measure in support of the governor's 30x30 initiative to protect 30% of the state's lands and waters by 2030.

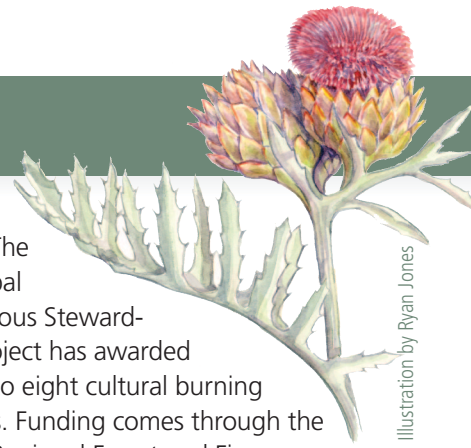
California has a reputation as an environmental leader, but we need to do more to be considered a leader in protecting biodiversity from invasive plants.

## ON THE COVER

Volunteers with the California State Parks Foundation pull invasive ice plant at Fort Ord Dunes State Park. This photo was submitted to the 2021 Cal-IPC Photo Contest with an inspired re-write of the 1990 hit song, "Ice, Ice Baby." Thanks to Matthew Todd for the photo and Michaline Todd for the submission (lyrics edited for space):

Yo VIP, let's pick it! • Ice, ice plant, baby. • Alright stop, collaborate and listen • Ice plant is back so we all gotta dig in. • Start by grabbing ahold of it tightly • To get it all out, gotta pull on it mightily. • Will it ever stop? Yo, I don't know • Turn on the lights, and it'll grow ... Love it or leave — we say no way! • We're out to eradicate, not to play. • It's an invasive, so we manually remove it • and come back again to be sure it hasn't re-rooted. • Ice, Ice plant baby • Coastal Iceplant baby

# Wildland Weed News



## CAL-IPC UPDATES

**Symposium 2021** – Thanks for an amazing 30th annual event in October! See highlights, p8.

**State funding** – We were successful in advocating for funding for the state's interagency Invasive Species Council of California and its advisory committee. The \$5 million is the first funding for the council and is to be used to protect natural resources. We continue to meet with agency and legislative partners to identify funding for invasive plant control, especially local Weed Management Areas (WMAs).

**Lassen treatment** – After the Dixie Fire burned much of the Lassen National Forest, we were able to get a Great Basin Institute crew in for a late season treatment of Canada thistle in a watershed slated for hydrologic restoration.

**Corps training** – We coordinated instructors from the Cal-IPC membership to train twenty youth from the Conservation Corps North Bay at the Hamilton Marsh home of the Novato Baylands Stewards.



*At the November training, members of the Conservation Corps North Bay learned how to look carefully at plant parts and use the iNaturalist "Seek" app to help identify common native and invasive plants. They also learned about the life cycles and treatment strategies of common invasives. Photos: Claire F Meyler.*

## YOUR MEMBERSHIP

Thank you for keeping your membership current. Note that your expiration date is shown on the mailing label of this newsletter. Cal-IPC's success in meeting its mission depends on your vital support.

**Spartina season** – Despite logistical challenges, the Invasive Spartina Team completed their 2021 survey and treatment season, covering numerous small patches in extensive marsh sites around San Francisco Bay tidal marshes, many difficult to access.

**Desert funding** – Cal-IPC advocated for AB-1183, which has now been signed into law, creating the California Desert Conservation Program at the state's Wildlife Conservation Board. This could be a source of funding for stopping invasive desert knapweed.

## OTHER NEWS

**Aquatic invaders** – The University of California has updated and expanded their California Aquatic Invasive Species website at [ucanr.edu/sites/CalAIS/](http://ucanr.edu/sites/CalAIS/)

**Wildlife rights** – A recent article in Revelator explores legal property rights for non-human organisms, posing the question, "all need somewhere to live, yet only humans own their homes. What if other species could own theirs as well?"

## Native

**fire** – The Intertribal Indigenous Stewardship Project has awarded grants to eight cultural burning projects. Funding comes through the state's Regional Forest and Fire Capacity program, in partnership with the Watershed Research and Training Center.

**Biocontrols** – The USDA-operated European Biological Control Laboratory (EBCL) is working to identify control agents for species included in the new 5-year plan, including medusahead, Sahara mustard, stinkwort, French broom, and tree-of-heaven.

**Cut stump** – The Stumpstopper attaches to a brush cutter and applies herbicide immediately to cut stumps.

**Natural infrastructure** – The federal infrastructure funding package includes support for invasive species control through federal agencies and roadside vegetation management through state highway departments.

**Delta weeds** – A special Issue of the Journal of Aquatic Plant Management features 14 peer-reviewed articles on the Delta Region Areawide Aquatic Weed Project (DRAAWP), a project funded by the USDA-ARS Areawide Pest Management Program from 2014 to 2018.

**CEQA streamlining** – The Cutting Green Tape initiative championed by the California Landscape Stewardship Network and the California Dept. of Fish & Wildlife has resulted in a 3-year pilot of a CEQA exemption for restoration projects.

**Rangeland presentations** – UCANR has posted videos of presentations from their Weed Management for Small Acreages Workshop on their Youtube channel.

**Feral hogs** – Gizmodo reported from a study in Global Change Biology that the soil disturbing activity of feral hogs releases as much carbon each year as 1.1 million cars.



# In Memory: Ken Moore (Dec. 23, 1938 – July 12, 2021)

By Jill Beckett and Kim Hayes

In the last edition of *Dispatch*, a brief article announced that Ken Moore had recently died, saying it was the “passing of a legend.” Those of us who knew Ken well, and even those who got to know him from just a few personal encounters, know that this is true. Ken was an amazing weed warrior, a mentor to many, and for some, a dear friend.

Ken grew up in Elm Grove, Wisconsin, where his curiosity about the environment led to a love and dedication to the natural world. As a kid he headed out after school to explore the countryside. One time he found a beautiful, barred owl recently killed on the side of a road. He said he had an epiphany as he held the owl. His desire to help Nature started right there and then. Ken always worked hard to do what he could to protect the integrity of the natural world. He lived his life in line with a strong environmental ethic.

Starting out in college he hoped to major in environmental studies at the University of Wisconsin, Madison. His advisor told him that the closest curriculum to what Ken wanted was Landscape Architecture, so that’s what he studied to get his degree. Already an excellent draftsman and artist, it seemed to be a good fit. But soon he realized his illustrated renderings of buildings and shopping centers for new developments were plainly inviting more habitat destruction. He wanted to restore lands and reverse the damage caused by human impact, so he changed his career trajectory to defend the environment. Even then, in the sixties, he saw that plants being used for landscaping were an environmental problem.

After participating in the massive but unsuccessful protests against the Diablo Canyon nuclear power plant farther south near Morro Bay, Ken arrived in Santa Cruz around 1980. He could see that French broom and jubata grass were widely invasive as he explored the mountain



*Ken Moore shows how to remove jubata grass with a Pulaski. (He would recommend wearing a shirt!)*

parks, hiking on many miles of old logging trails. It appeared that no one was doing the important resource protection work of controlling wildland weeds in the Santa Cruz Mountains. After researching these invasive plants, he realized he could help by removing them and letting the native plant community come back. This was not the typical practice for the time; Cal-IPC did not form until a decade later. Ken’s wildlands restoration work was ahead of its time and helped lay the foundation for the work we do today.

Ken loved tools, and he modified every tool to make it work better. He was also an amazing jack-of-all-trades. He was good at so many things, which came from his many experiences before becoming a weed warrior. He was an artist, a builder of solar powered and heated homes, a furniture maker, musician,



*Ken and fellow Wildlands Restoration Team volunteers controlling French broom in the 1990s.*

audiophile, gardener, and activist for Earth. Furthermore, he had the best darn handwriting of anyone!



He loved studying a well-written resource, which probably helped him become such a leader in helping others through his renowned hands-on trainings. How many of today's weed workers in California took away a notebook of tips from one of Ken's tailgate tool sessions? Thankfully Cal-IPC's website has a number of videos of Ken sharing information. Being an innovator seemed easy for him although we know he put hours and hours into his creations, not to mention the trial and error of field testing before he'd share an idea with others. He loved figuring out what would be the best tool to get a job done efficiently and safely.

Ken founded the Wildlands Restoration Team (WRT) in 1990. At that time, he could see a real need for public lands to be managed with invasive plant control as a core focus to support native species and ecosystem functions. So, he got to work. People visiting the parks started to ask, "Who is this guy working on the trails doing the weed work?" Within a year he was getting more and more volunteers to work on the French broom.

From natural resource managers to law enforcement officers, Ken was well respected and appreciated for his diligent work. He became a resource for his knowledge of the backcountry in the parks in the Santa Cruz Mountains. He had a unique and broad knowledge of the lands. Ken and the WRT were presented with an award from State Parks in 1998 ("Take Pride in California") and from Cal-IPC in 2004 ("The Golden Weed Wrench Award for Land Manager of the Year").

Ken's passion, teaching skills, huge generosity and charisma attracted diverse volunteers who were interested in helping the planet. Once they saw the results of their work, many stayed on as regulars. People would keep coming back in large part because of Ken, and WRT changed many people's lives by getting them involved in hands on restoration work. WRT was also a source of dear lifetime friendships for many of us.

Ken's legacy lives on in all of us who do this work. His legacy also lives on in the beautiful Santa Cruz Mountains where the benefits from his thousands of hours of loving labor will endure for a long time to come.

*Jill Beckett was Ken's partner and a volunteer for the Wildlands Restoration Team. Kim Hayes was a longtime friend of Ken's, WRT volunteer, and a former Cal-IPC board member. She now resides in NW Michigan. Find WRT online at [wildwork.org](http://wildwork.org).*



Ken, in his own words "armed and loaded," with his custom-made tool belt and WRT work truck.



Ken teaches a Field Course on hand tools for Cal-IPC.



# Weed Alerts 2021

Jutta Burger, Cal-IPC, and Robert Price, CDFA

Cal-IPC Weed Alerts highlight species that have either been newly discovered in California or have been rapidly expanding and were perhaps already highlighted in past years. Each year, we present weed alerts jointly with the California Department of Food and Agriculture (CDFA). This year, none of our six Weed Alert finalists had been nominated previously, and four of the six were discoveries from wildland habitats that were either verified for the first time or found and verified in 2021. We are hoping that the high number of new discoveries we had this year are evidence of more focus on early detection and improved reporting and not more importations of exotic species!

## Weed Alerts for 2021:

(1) Leafy Caulerpa (*Caulerpa prolifera*) is a short-statured, highly competitive marine alga native to the Atlantic. This species was

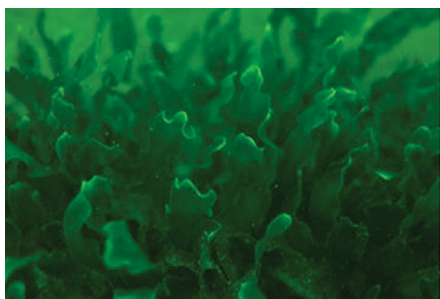
found for the first time in western North America in China Cove, Newport Bay (Orange County) in 2021 during an underwater video shoot. The population has now been mapped and removed as part of a first phase of an eradication program led by the California Department of Fish and Wildlife.

(2) Australian eelgrass (*Vallisneria australis*) is a freshwater aquatic plant native to eastern Australia. This species was first found in the Sacramento Delta in the summer of 2021, a new record for North America, and multiple populations in the Delta area have been confirmed using molecular techniques. The plant spreads vegetatively through fragments that are moved by water and boats. It is considered invasive in New Zealand. Efforts to map the extent of the infestation are still underway, and CDFA has recently proposed a "B" Pest Rating for it.

(3) Garlic mustard (*Alliaria petiolata*) is a biennial herb that favors moist, shaded, or open environments and is native to Eurasia. This species is considered one of the worst invaders of northeastern North American forests. A California Botanic Garden survey discovered a small population of this species in 2020 as part of a survey they were conducting for the San Bernardino National Forest. Although garlic mustard occurs and is listed as a noxious weed in Washington and Oregon, this population is the first verified wildland find in California. The U.S. Forest Service is managing its removal.

(4) Red-purple ragwort (*Senecio elegans*) is an annual showy purple-and-yellow-flowered ornamental plant that is native to the Cape region of South Africa. It has been known from isolated records in California for over 100 years. Red-purple

(Continued on page 7)



Clockwise (left to right with photo credit): *Caulerpa prolifera* (Brian Owens, CDFW); *Alliaria petiolata* (Bruce Ackley, Bugwood.org); *Vallisneria australis* (NIWA: Freshwater Invasive Species of New Zealand, 2020); *Lathyrus nissolia* (Emily Allen); *Pancratium maritimum* (Diana Wing); *Senecio elegans* (Ethan Rayner).



# Tool review: Green Shoots foam herbicide applicator

Steve Manning, Invasive Plant Control, Inc.

**T**he Green Shoots® Foam Herbicide System is advertised as a precise, easy-to-use, and highly effective tool for managing invasive plants. In 2019, we conducted a trial utilizing the Green Shoots system on Chinese privet (*Ligustrum sinense*) in the 3,000-acre Warner Parks in Nashville, TN. Chinese privet is considered one of the worst invasive plants in the South. With its aggressive habits, these shrubs often form dense thickets, particularly in bottomland forests and along fencerows.

During this trial, we utilized a cut stump treatment to manage Chinese privet along a stream in the Warner Parks. Traditional cut stump methods often yield around 90% mortality rate using water-based herbicides and a surfactant. This trial was conducted in 36-degree weather when mortality rates are generally not as good. Utilizing the Green Shoots Large Handheld Foam Dispenser with the extension nozzle attachment, our applicators applied a glyphosate mixture containing 41% active ingredient, water, and a small amount of the Green Shoots Blue Foaming Agent which acts as a mild non-ionic surfactant. While we used glyphosate, the Green Shoots system also works with other water-based herbicides.

After cutting the privet 2-3 inches from the ground to reduce the distance the herbicide has to travel, we brushed debris away from the cut stump and applied the foam herbicide mixture within 30 seconds. The biggest advantage of this product was that it allowed for a more precise application, reducing unwanted runoff. The foam also spreads and holds onto the cut area better than just using water and a surfactant.

The blue dye that is already part of the foaming agent reduces the mess often created when dispensing blue dye from larger bottles. The bottle itself was sturdy and held up to extensive use.

After one year, the treatment resulted in 100% control of the plants treated.



Steve demonstrates how the application process works on a cut stump. Photo: Steve Manning.

Though set-up took a little time, this system could provide the wildland weed manager with a useful tool for more precise application of herbicide when using a cut-stump approach on woody plants that are prone to resprouting. Currently, the Green Shoots blue foaming agent is not registered for use in California, but Green Shoots is working on it.

*Steve Manning established Invasive Plant Control, Inc. in 1997. He has been working on invasive species for over 20 years. He serves as board president for the Pacific Northwest Invasive Plant Council and he founded the annual Innovations in Invasive Species Management conference, now in its fourth year.*

## Weed Alerts 2021

(Continued from page 6)

ragwort appears to be spreading and aggressively competing with native species in coastal dune habitat across northern and central regions of the state. It has also been noted as an environmental weed along the southern coast of Australia.

(5) Sea daffodil (*Pancratium maritimum*) is another showy ornamental that has naturalized locally in coastal dune habitat in California. This species is native to the Mediterranean and has characteristics — such as a large bulb and seeds that float — that make it likely to persist and spread along California's coastline. Established populations are only well documented from Ventura County, where it is has proved difficult to remove in Buena Vista State Park. A recent record from Carlsbad (San Diego County) and older records from El Segundo Dunes (Los Angeles County) should be further investigated.

(6) Grass vetchling (*Lathyrus nissolia*) is an annual pea with an affinity for moist meadow areas. This species, native to Eurasia, was first found in the wild near Willets (Mendocino County) in 2014. It was brought to the attention of the larger

botanical community this year, when it was found to have spread over several acres. This species has also been recorded from Oregon but is otherwise unknown in the wild in North America. Its recent local spread and affinity for habitat that is shared with several sensitive native plant species are reasons for concern.

Two additional species are worth noting for amateur naturalists and professionals. Memphis grass (*Cutandia memphitica*) was recently discovered in the Twentynine Palms area (San Bernardino County). Any new observations of this Mediterranean species would help us better understand its risks. Similarly, we need more information about swamp wallaby grass (*Amphibromus nervosus*), which has been reported from vernal pool edges near Santa Rosa (Solano County) and Sacramento County but is likely under-reported.

As you work or recreate outside across the state, please keep on the look-out for Weed Alert and other under-reported species and document where you find them (use Calflora or iNaturalist). Contact Cal-IPC ([jbarger@cal-ipc.org](mailto:jbarger@cal-ipc.org)) or CDFA ([Robert.price@cdfa.gov](mailto:Robert.price@cdfa.gov)) with any reports of new non-native species in your area.



# Highlights from the 2021 Cal-IPC 30-Year Anniversary Symposium

Doug Johnson and Claire Meyler, Cal-IPC

In October 2021, Cal-IPC proudly hosted our 30th Annual Symposium, gathering our largest audience ever — more than 770 land managers, researchers, and volunteers! Over four days, participants from California, and from around the world, shared the latest in invasive plant management through talks, posters, and discussion groups. Our theme, “Expanding Community to Protect Biodiversity,” celebrated and welcomed the great range of people involved in stewarding our lands.

## Expanding the Community in Conservation

The Symposium kicked off with a series of presentations directly tied to our theme, with the goal of inspiring both individual and collective growth towards incorporating values of Justice, Equity, Diversity, and Inclusion (JEDI) in our conservation work. Josie Bennett explained how conserving the open spaces that we love requires acknowledging the links between social justice and environmental justice.

Shelana deSilva explained why this work is important beyond the moral reasons, presenting the case for improved project outcomes, more durable partnerships, and greater resilience for our field of practice over the long term.

Amy Lethbridge shared her experience designing programs and advocating for social justice and increased access to park lands, bridging the goals of park management with the needs of underserved communities.

A series of concurrent workshops explored several themes in depth: the history of conservation and social justice; JEDI in practice in conservation organizations; JEDI basics; and integrating tribal/traditional ecological knowledge (TEK) and working with tribal partners. These inspiring presentations set a tone of



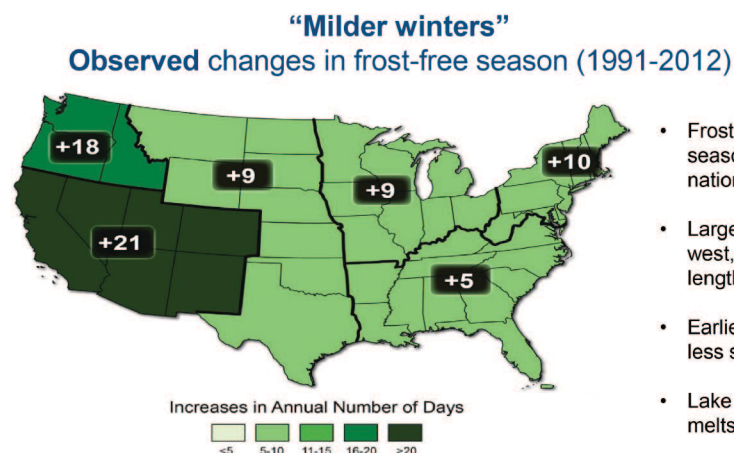
*Regional similarities — including Mediterranean climate and an extensive Pacific coastline — allow for native species from one region to become invasive in another. Pampas grass (Cortaderia selloana), native to Chile, is a high-rated invasive in California. Meanwhile, our native poppy (Eschscholzia californica) is invasive in Chile. Photos: (left) Robert Case (right) Matthew Dillon.*

welcoming and thoughtful engagement for our virtual gathering.

## Global Biodiversity and Invasive Plant Management

Speakers joined us from around the world to discuss their work with invasive plants. Arne Witt shared the degree to which

invasive plants impact the livelihoods of many people in Africa, helping to put our focus on protecting biodiversity in context. With more than 40% of the population below the poverty level and 61% of people engaged in farming, most of Africa’s people are directly dependent on natural resources to survive. Aníbal



- Frost free and growing seasons have increased nationally since 1980s
- Largest increases in west, continued lengthening is projected
- Earlier spring snow melt, less snow overall
- Lake ice forms later, melts earlier

*Milder winters can provide an advantage to some invasive plants, which show an earlier spring “green-up” than native species. Warming waters also give a competitive advantage to some invasives, resulting in longer growing seasons. Image credit: Slide from Carrie Brown-Lima’s presentation, with graphic from the NOAA National Climate Data Center, 2014 NCA report.*



Pauchard compared invasive plant dynamics in California with that in Chile, another Mediterranean climate region. His research found that the two regions share 491 non-native plant species (including several invasive acacias and broom species) but, overall, California has a higher number of non-native species from more diverse origins.

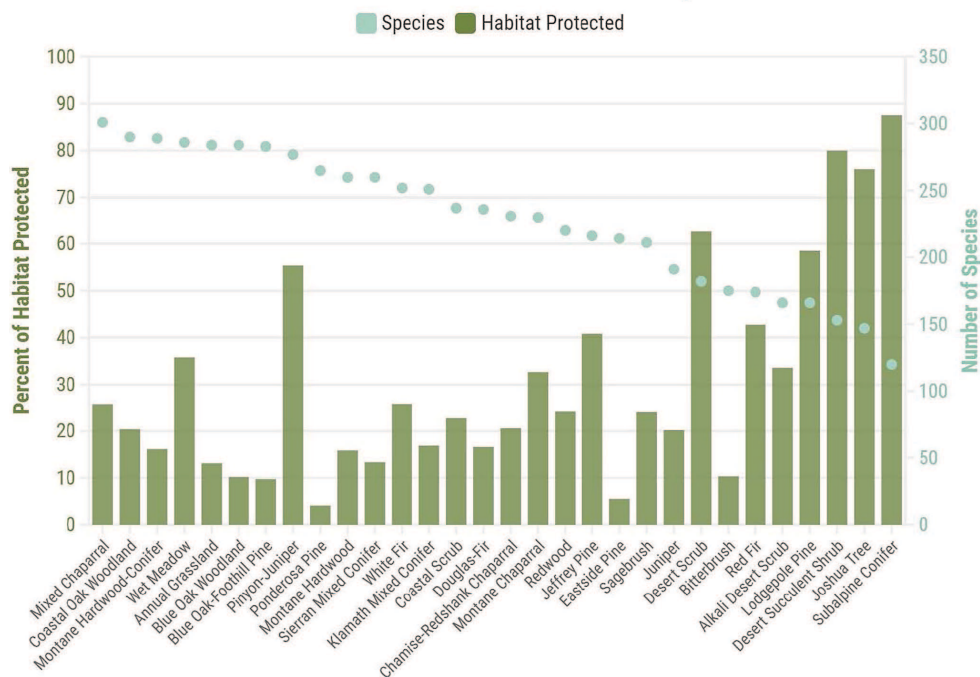
Jodi Romyn described the many engagement strategies used by the Invasive Species Council of British Columbia, including simple messages for behavior change. Jaco Le Roux provided research findings on the ways soil microbial communities respond to — or even drive — plant invasions, based on his work studying Australian acacias. Liz Wandrag offered additional lessons from studying soil microbial communities in Australian grasslands.

This range of topics, organizations, speakers, and locations gave California land managers perspective on our work here. Every place in the world is having to address invasive plants. In this age of video communications, we can greatly expand the reach of our efforts to learn and take inspiration from others taking on the same challenge.



In eastern Africa, invasive mesquite (*Prosopis juliflora*) enhances the malaria parasite transmission capacity of *Anopheles* mosquitoes by increasing insects' access to standing water, resting sites, and nectar. Photo: Rohalamin, Wikimedia Commons.

### Vertebrate Richness and Protection by Habitat



California's grasslands and oak woodlands are relatively unprotected, yet they are critical habitats for global biodiversity. Estimates show that an additional 5.85 million acres of protection is needed to reach 30% goals for these ecosystems. Image credit: Nature Conservancy, provided by Dick Cameron.

### Invasive Plant Management in California's 30x30 Initiative

California has joined the international movement to conserve 30% of lands and waters by 2030. The governor's executive order pledging California's commitment recognized the connections between building climate resilience, protecting biodiversity, and advancing social equity. Christina Sloop, Science Adviser for the California Department of Fish and Wildlife, provided background on 30x30 and how the conservation community can provide input on development and implementation as members of the California Biodiversity Network ([cabiodiversitynetwork.org](http://cabiodiversitynetwork.org)).

Carrie Brown-Lima, Director of the New York Invasive Species Research Institute at Cornell University, described the interactions between invasive plants and climate change. Milder winters, shifting growing seasons, and rising carbon dioxide give a competitive edge to many invasive species, making them bigger and harder to kill. Regional Invasive Species and Climate Change management groups are forming across the country to address these issues ([risccnetwork.org](http://risccnetwork.org)).

Andrea Williams, Director of Biodiversity Initiatives for the California Native Plant Society, illustrated how community science is contributing to meeting conservation goals and stressed the importance of integrating fine-scale vegetation maps into priority protection programs.

Tom Robinson, lead for the Conservation Lands Network, demonstrated the detailed work that has been done using GIS to prioritize lands for protection. He highlighted the Bay Area Green Print tool, which provides a framework for planners and decision-makers to integrate conservation into infrastructure and land use planning ([www.bayareagreenprint.org](http://www.bayareagreenprint.org)).

Dick Cameron, Director of Science for The Nature Conservancy, California, shared the complexity of measuring what counts as "conserved." More than 60% of California's major natural habitats are not yet protected at 30% statewide, yet these habitats support a rich diversity of vertebrates. The panel discussion explored ways that the 30x30 framework can be harnessed as a vehicle for stronger invasive plant management at the landscape level.

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# A conversation with Carl Anthony about environmental justice

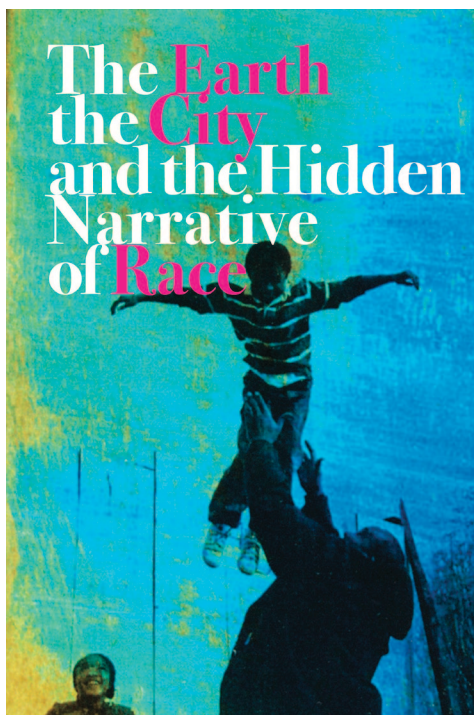
Claire F. Meyler, Doug Johnson, and Jutta Burger, Cal-IPC

*Cal-IPC staff had the pleasure of talking with Carl Anthony — an American architect, regional planner, social justice activist, and author — on engaging community in environmental causes.*

*Carl is the founder and co-director of Breakthrough Communities, a project dedicated to building multiracial leadership for sustainability. Carl is the former President of the Earth Island Institute and is the co-founder and former executive director of its urban habitat program, one of the first environmental justice organizations to address race and class issues. His memoir, *The Earth, the City, and the Hidden Narrative of Race* (2017), shares his perspective as an African American child in post-World War II Philadelphia, and weaves together themes of regional inequity and climate change.*

**Cal-IPC:** *As a pioneer of environmental justice work, your career predates today's efforts on justice, equity, diversity, and inclusion by more than three decades. Each year, as we meet at our annual Symposium, we are paying attention to who is attending and looking to actively include the broadest possible community of people in stewardship. How can we continue to expand our reach?*

**Carl Anthony:** It's really interesting, all the different types of people that are engaged in protecting the resources of our natural world, but also the efforts of people of color to address many of the issues that have fallen between the cracks — social justice, inequity, etc. — as we move towards a comprehensive understanding of how it affects all of us. One of the challenges is the relationship between invasive species and the respect for diversity in the human community, and wondering how do you make that



*Carl Anthony's 2017 memoir connects the logics behind slavery, community disinvestment, and environmental exploitation.*

linkage? It's fascinating the ways these fields overlap and intersect. We all benefit from greater understanding, but it can be a struggle to deal with the negative connotations.

**Cal-IPC:** *It is a challenge because the terms used to talk about invasive plants can feel exclusionary, such as "alien, invasive, or exotic." So, we need to talk about the positives: diversity in our community is a strength and protecting biodiversity in nature creates a healthy environment. From a scientific perspective, only a small population of non-natives become invasive, but the semantics are critical. The story needs to be simple and remain accessible to a broad public.*

**Carl Anthony:** It's challenging because of the historical overlay of the issues, and

our understanding of our relationship between people. I'm wondering if you could help me by explaining the conflicting viewpoints of invasive species and "invasive" human beings.

**Cal-IPC:** *The theme needs to be that diversity is important. We love plants, but we need to remove some to help others thrive. We are pushing for that ecological literacy, where a community can make bigger connections and see how cultural diversity is also something that is important to address. There was a concern that folks would question its relevancy when we started talking about social justice in the environmental field, but we have received so much positive feedback. Our audiences understand that we can't achieve our conservation mission without having everybody involved. If people aren't involved because there are barriers, then we need to work on those barriers.*

**Carl Anthony:** The problem, as I see it, is that if we were talking about different types of grass, it would be harder for most people to see and understand the difference, to discern which ones are invasive and why that is a problem. It's easier to understand when it's a tree or vine that spread across a terrain and can have a visible impact. They seem to be quite different than the native trees, expand so rapidly in an area. What is more problematic is when similarities are not as descriptive. Most invasive impacts can be much harder to understand.

**Cal-IPC:** *Exactly. There are plants that are much more diminutive but have a significant impact. Explaining that gets more technical. Then, there is the fact that getting a plant early before it can spread is strategically more effective. So, when you have a plant that isn't causing*



*big problems yet, but you anticipate that it likely will, it can take some convincing for a layperson to understand. People may see the term “invasive,” and it carries connotations of being bad or unfair because it’s “other.” That is something that we struggle with.*

**Carl Anthony:** When we talk about plants, we’re often talking about species that are really quite different from one another. When we talk about the human species, we have a diversity of social history. If you look at the relationship with the land in terms of African American history, they were brought in for this invasion of people with European heritage as part of their transformation of the land via plantations. Agricultural products have had a huge influence on the country’s settlement. Could that be construed as invasive? And to what extent do the people who were raised in that context have an understanding of how the experience has structured our relationship to the environment? Compare that to the Native Americans, a quite different history of colonization.

But we have an overwhelming connection to a shared heritage of our humanity. How do we draw a line of understanding across social divide?

**Cal-IPC:** *It is worth exploring where people come from historically in their relationship to the land. We can also develop an understanding of how our communities of land stewards might include farmers, migrant workers, etc. It’s easy to claim that all humans have connection to the land, to nature, but in terms of cultural and familial connections, that might be very different. And how does that potentially affect perspectives on land management for Black, Indigenous, and people of color in this country?*

**Carl Anthony:** I think the history of brutality of the slave plantation, the history of sharecropping, the transformation of economic development and industrial development, all of this produced a distortion of enormous



*Cal-IPC Executive Director Doug Johnson and Carl Anthony. Photo: Martin Nicolaus.*

proportions, both environmental and social. The planting of species — including exotics and non-natives — into factory farms and plantations had a major shaping effect on the history of this country. Over several hundred years, we have become reliant on these species through a system that exposes people to pesticides, physical danger, etc. Understanding this crisis is not in the self-interest of industrial agriculture. And, over generations, African Americans have been systematically denied access to the outdoors, to farm their own lands, or to neighborhoods with parks and green spaces. We have a huge distortion of the landscape in America, based on racism. The new-found interest in diversity raises a lot of questions that haven’t been solved.

The issue of Native people and restoring land to Native traditions must be part of the equation. The dominant society and their exploitation of the land, of other people, and of plants, overlaid with the sort of cultural transformation towards embracing diversity that people are starting to think about now... How do you begin to understand who we are as a people?

There are a number of communities, including African Americans, that are embracing the land and making something useful — building community

gardens and farms, joining recreation groups, and fighting for environmental justice. If we can consciously come away with better understanding of our responsibilities as people to the land, then we can begin to reconstruct the last several hundred years of destruction into a framework that is potentially positive for our communities and for other communities.

**Cal-IPC:** *If we were able to have a larger vision where lands stewardship connected cleanly with food production and sustainable management, that would be a good thing. Those bubbles haven’t quite met yet, but we do see progress.*

**Carl Anthony:** I don’t think we can resolve this question in a short time. Our experience of segregating populations and the lack of communication between different communities exacerbates the problem. If we could relieve that, examine our own history, and understand the history of others, it would be a good way to begin. If we could create the conditions where people could create a livelihood out of the land without destroying the planet while we become more conscious of our impact, then we’d have something to work with. After 50 or 100 years, it would make a difference.



# Successful biological control of Dalmatian toadflax (*Linaria dalmatica*) in southern California

Michael J. Pitcairn, CDFA; Lincoln Smith, USDA-ARS; and Patrick J. Moran, USDA-ARS

**D**almatian toadflax, *Linaria dalmatica* (Plantaginaceae), is an exotic weed that invades rangelands, roadsides, and natural areas throughout California. It is native to the Mediterranean region of Europe and Asia and was introduced to North America in the late 1880s. Its earliest record in California is an herbarium specimen collected in 1920 in the mountains north of the city of Los Angeles. Since then, it has spread widely and is currently reported in 41 counties statewide.

Many of the infestations of Dalmatian toadflax throughout southern California have been eliminated or substantially reduced in size due to local control measures. However, a very large infestation of Dalmatian toadflax persists near Gorman in the Tehachapi Mountains in southern California. The infestation is over 1,000 acres and occurs on property managed by the US Forest Service and the State of California's Hungry Valley State Vehicular Recreational Area (HVSVA).

The stem boring weevil, *Mecinus janthiniiformis*, which originates from Macedonia, is permitted for release in the continental USA, but not generally in California because it is known to be capable of attacking a native snapdragon, *Antirrhinum virga* (A. Gray). However, in 2007 California issued a permit for release in Kern, Ventura, and Los Angeles counties, which are far from the region (northwestern California) where *A. virga* occurs. The weevil is not permitted for release north of Kern County, though it has spread on its own into northeastern California.

In 2008, we released over 1,000 adult



Dalmatian toadflax, *Linaria dalmatica*, in flower. Photo: Baldo Villegas, CA Dept. of Food and Agriculture.

*Mecinus janthiniiformis* at the HVSVA to provide biological control of Dalmatian toadflax. The stem weevil deposits eggs in the flower stems, and its larvae feed by tunneling within the stems. When fully developed, the larva pupates within the stem and waits until the following spring when it emerges as an adult. There is one generation per year. The damage caused by the feeding larvae reduces the number of flowers and seeds produced by a plant. At high population levels, dozens of eggs can be deposited within individual stems and the resulting feeding damage can substantially reduce or completely suppress seed production.

Following their release, the weevils established at the three release sites and infestation rates increased exponentially. By 2012, 100% of stems within 15 meters of each release location were

infested, and the weevils had spread to more than 550 meters away from their release point. All was looking good.

However, on May 15-20, 2013, a large wildfire (the Grand Fire) burned through the release area at the HVSVA, scorching the aboveground vegetation. The destruction of the toadflax stems killed any developing larvae and destroyed potential oviposition sites for any adults that may have survived the fire. Dalmatian toadflax has perennial roots, and most plants survived the fire and resprouted later the same year. A survey in August 2013 determined that the stem weevil had been exterminated except at one small area at the foot of Frasier Mountain that was sheltered from the wind-driven fire on property managed by the US Forest Service.

Based on the encouraging results of





Adult stem weevils, *Mecinus janthiniformis*, overwintering in Dalmatian toadflax stem. Photo: Lincoln Smith, USDA Agricultural Research Service.

establishment and population increase prior to Grand Fire, *M. janthiniformis* was released again in April and June 2014. As before, more than 1,000 adult weevils were released. From 2014 through 2019, study sites within the infested area were monitored annually and both vegetation and weevil abundance were documented. Vegetation was monitored by estimating plant cover along permanent transects. Weevil abundance was monitored by collecting stems in late autumn or early spring and dissecting them under a microscope in our laboratory and counting all immature and adult weevils.

After the second weevil release, *M. janthiniformis* re-established at three release sites. By 2016, weevils had spread to six sites (the three release sites and three sites further away to monitor dispersal), and by 2017, 100% of stems were attacked at all but one site, where the rate was 71.4%. Vegetation cover of Dalmatian toadflax decreased from 41% in 2015 to 7% in 2017 and to less than 1% cover (or trace levels) by 2019, a decrease of 99% from peak levels. The change in cover is evident in the before and after photos.

During this time period, cover of annual grasses increased consistently until 2018 (73% cover) but decreased again in 2019 (37%). Annual forbs and annual grasses were generally codominant (each about 50%) during the post-fire study period. Perennial grass cover was less than other vegetation classes but increased from 5% in 2014 to 16% in 2019. Perennial forbs (2.4%) and shrubs (0.4%) were the least abundant vegetation classes, and neither significantly changed over time.

As a weed control method, biological control can take many years, sometimes decades, to see a successful reduction of a target weed because the seed bank needs to be exhausted before a decline in the weed population can occur. At the HVSRA in southern California, Dalmatian toadflax cover decreased by 99% in five years which may be due, in part, to the short life span of its seeds and insufficient precipitation to support seed germination and seedling survival. Abundance of the stem weevil increased rapidly at the release sites, and the weevils spread throughout the study area within three to four



6/4/2020



Before-and-after photos of the Dalmatian toadflax infestation at the Hungry Valley State Vehicular Recreation Area near Gorman, CA. Red circles indicate a live toadflax plant which is not flowering. Photos: Baldo Villegas, CDFA (5/19/2008), and Lincoln Smith, USDA-ARS (6/4/2020).

years after release. The lack of parasitism and mild winter temperatures may have contributed to the high survival rates (92%) of adult weevils over the winter months. Thus, within 3 to 4 years of each release, the weevils were able to attack 100% of Dalmatian toadflax stems at release sites, and the attack rate far exceeded the five weevils/stem threshold reported elsewhere as the threshold to start impacting the target weed. It will be interesting to see if the stem weevil will continue to survive and impact its target plant during this subsequent period of low host abundance.

A version of this article was published on the UC Weed Science Blog, Oct. 4, 2021.

### For additional information:

Smith, L., D.M. Woods, M.I. Wibawa, V. Popescu, P.J. Moran, B. Villegas, M.J. Pitcairn, and C. Hon. 2021. Release and establishment of the weevil *Mecinus janthiniformis* for biological control of Dalmatian toadflax in southern California. *Biological Control*. 104633. 115 DOI 10.1016/j.biocontrol.2021.104633

Dalmatian toadflax in: *Best Management Practices for Non-Chemical Weed Control*. Report to the California Department of Pesticide Regulation under grant number 18-PML-G002. California Invasive Plant Council. [www.cal-ipc.org/BMPnon-chem](http://www.cal-ipc.org/BMPnon-chem)



# Cal-IPC Symposium Highlights

(Continued from page 9)

## Congratulations to our 2021 Photo Contest winners!



A proud volunteer with Save Mount Diablo shows off a "pesky pick of perennial pepperweed" during a workday on the Marsh Creek 4 property. In 2018, the Marsh Fire blazed through the property, destroying a gazebo and scorching a restoration site. Fortunately, the resilient vegetative community is returning. Coupled with additional restoration efforts, what was once a monoculture of annual weeds is becoming a biodiverse habitat. Roxana Lucero, Save Mount Diablo. [First place winner]



Sea daffodil (*Pancratium maritimum*), highlighted as a "2021 Weed Alert" (p6), flowers in large numbers behind the lifeguard station at San Buenaventura State Beach. Diana Wing, Ventura County Agriculture Commissioner. [Second place winner]



A herd of goats devours invasive black mustard (*Brassica nigra*), their favorite plant, in spring 2021 — yummy! Carson Helton, Sage Environmental Group. [Third place winner]

## Congratulations to our student winners!



Full Length Talks First Place Winner: Sarah Gaffney, UC Davis, "Plant-soil feedbacks: the benefit of field-based community level study in uncovering their role in restoration."



Lightning Talks First Place Winner: Rebecca Nelson, UC Davis, "The effects of *Vicia villosa* invasion on grassland plant-pollinator interactions."



Poster First Place Winner: David Banelas, "The removal of invasive woodland leads to community shifts in arbuscular mycorrhizal fungi."

Other student winners: Full Length Talks Second Place Winner: Mark Mazhnyy, Cal Poly Pomona, "Using plastic tree shelters and mechanical weeding practices to improve post-fire ecological restoration of highly invaded California native plant communities." Full Length Talks Third Place Winner: Robert Fitch, UC Santa Barbara, "Investigating drivers of plant abundance and

community structure on fuel breaks." Lightning Talks Second Place Winner: Joanna Tang, UC Santa Barbara, "Increasing the Diversity of People and Ecosystems Through Urban Restoration Projects." Poster Second Place Winner: Taylor Edwards, Cal Poly Pomona, "The Impact of Small Vertebrate Consumers on Community Assembly in Degraded California Sage Scrub."

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A special thank you to our generous 2021 Year-End Challenge donors! Gifts received after December 9 will be recognized in the next issue.

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## WILDLAND WEED CALENDAR

*Check all websites for latest event updates*

### **Northern California Botanists**

January 10–11, Online  
[norcalbotanists.org](http://norcalbotanists.org)

### **California Association of Resource Conservation Districts**

January 10 – February 4, Online  
[carcd.org](http://carcd.org)

### **California Weed Science Society**

January 19–21, Sacramento, CA  
[www.cwss.org/conferences](http://www.cwss.org/conferences)

### **National Invasive Species Awareness Week (NISAW)**

February 28 – March 4  
[www.nisaw.org](http://www.nisaw.org)

### **Public Lands Alliance**

March 6–10, St. Louis, MO  
[www.publiclandsalliance.org/pla2022](http://www.publiclandsalliance.org/pla2022)

### **Western Society of Weed Science**

March 7–10, Newport Beach, CA  
[www.wsweedscience.org/annual-meeting](http://www.wsweedscience.org/annual-meeting)

### **SERCAL**

May 11–13, Carmel Valley and Online  
[sercal.org/sercal2022](http://sercal.org/sercal2022)

### **California Native Plant Society**

October 20–22, San Jose, CA  
[conference.cnps.org](http://conference.cnps.org)

### **California Islands Symposium**

Fall 2022  
[californiaislands.net/symposium](http://californiaislands.net/symposium)

### **Cal-IPC Symposium**

October 2022  
[www.cal-ipc.org/symposium](http://www.cal-ipc.org/symposium)

***Target 6. Manage pathways for the introduction of invasive alien species, preventing or reducing their rate of introduction and establishment by at least 50 percent, and control or eradicate invasive alien species to eliminate or reduce their impacts, focusing on priority species and priority sites.***

— Draft Post-2020 Global Biodiversity Framework, United Nations Convention on Biological Diversity